Graphical Times.
Volume 6, Issue 24, 2007.

Welcome back to term 4!

NZAMT10 Conference.

What a great week at St Cuthberts College, will definitely be the talk of term 4 and beyond, well done to Auckland Mathematics Association and the conference committee. Looking ahead to 2009 sees Manawatu being the host region. π in the sky EXTENDING MATHEMATICAL HORIZONS 29 September – 2 October 2009 Palmerston North.
Electronic handouts from conference available online from: www.nzamt.org.nz
Goto: NZAMT 10 or use the web address below:
http://www.nzamt.org.nz/sites/cms/index.php?option=com_content&task=view&id=91&Itemid=113
A summary of a few sessions:
1.   Futureintech promote careers in technology, engineering and science, all of which require a good level of mathematics. Recruiting young (under 30), enthusiastic graduates, whose employers release them to work with schools. These ambassadors can be used by teachers to address the particular needs you recognise for your students. It may be to talk about the importance of taking calculus or statistics, prior to the time that students select options for the following year, it may be to show students some of the careers open to them if they have a mathematical aptitude, or it may be to bring a new topic to life by showing how this knowledge is used every day at work (for instance a surveyor talking trigonometry and measurement or a food technologist talking about the statistical trials done in product development and consumer compliance requirements). The ambassadors talk about their careers, but the presentations are designed to provide the outcome you state in advance for your students. Futureintech can present a session at Primary, Intermediate or Secondary schools, and this service is free. There are Futureintech facilitators around the country. If you'd like to involve us in your programme, just get in touch a Futureintech Facilitator. Website: http://www.futureintech.org.nz/

2.   Douglas Butler and his website TSM '**Technology for Secondary/College MATHEMATICS**' with a huge amount of links.

[Technology for Secondary/College Mathematics]
TSM RESOURCES

*Internet Resources
for the Classroom*

www.tsm-resources.com

Visit: http://www.tsm-resources.com/

Included in this terms newsletter are:
Graphic calculator activities –
- **Worksheets for :**
    1. **Graphic calculators**   **– Finding the derivative function in STAT mode.**
    2. **CAS**   **– Conic Sections**

Term 4 pricing list – included in this mailout.

Mathematics Department Cycle [Pass it on to . . .]

	→		→		→		→		→	
	→		→		→		→		→	

Workshop opportunities.

Workshop opportunities, if you would like to have a workshop for teachers and or students then please make contact with *Graphic Technologies*. A large number of schools are taking up this opportunity either singularly or as a cluster of

schools with both the graphic calculator or with the ClassPad300+, to look at how the graphic calculator and CAS could impact on and be integrated into your classroom practice.

CFX9850GC + with 64kB memory.

The CFX-9850GCPlus has over 900 functions and 64KB Total Memory.
List editor creates, edits and manages 36 separate data lists.
Special price for term 4, 2007 - $100+GST [RRP $189.00]
A new teacher in the department or one for yourself and your department members- treat them to the NEW CFX9850GCplus model, a colour graphic with 64KB memory - saving over 40%. Or alternatively, buy 19 FX9750G+ and 1 CFX9850GC+ for the pricing of 20 FX9750G+.

Some basic functions on the ClassPad300.

**Using the Spreadsheet Add-In Application – The Spreadsheet is a new Application for Version 2**

Entering and Graphing Data
- Tap Menu and then Spreadsheet
- Tap in cell **A1**
- Input the data shown pressing **EXE** after each entry
- Tap the **column heading** for column **A** to select it
- You can open the Graph menu and select Column/Clustered
- Tap the down arrow on the right and select
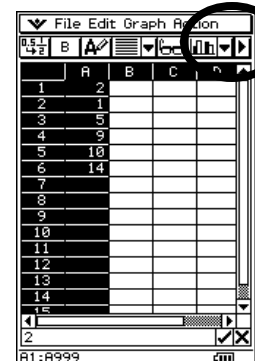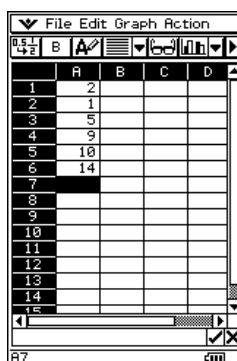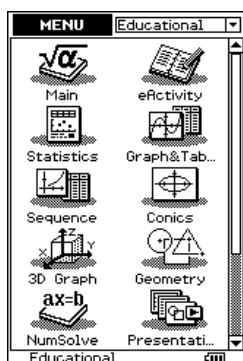
Drawing a Regression
- Open the **Series menu**
- Select **Trend / Exponential**
- Tap on the regression curve to select it
- Press on the curve near point (0,0) and drag to cell **B1**
- Change cell **A2** from 1 to 4 and press **EXE** (the regression curve updates automatically), change it back to 1
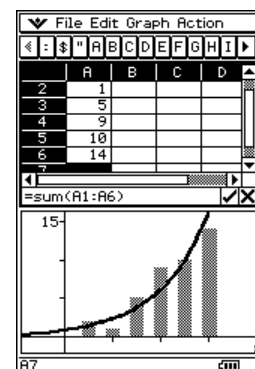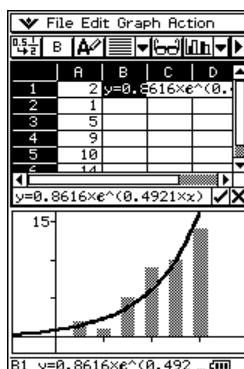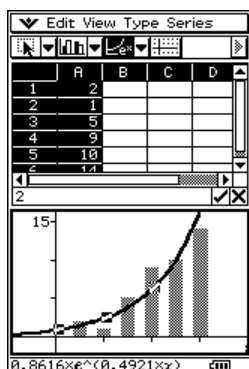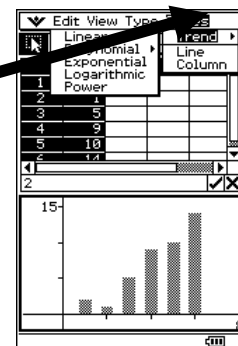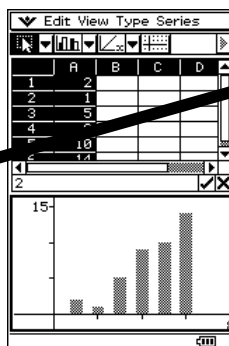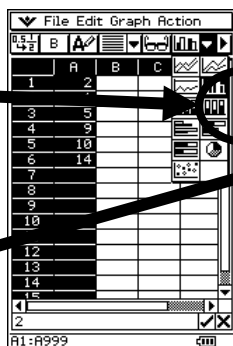
Summing Data
- Tap in cell **B2** and then tap Resize
- Tap in cell **A7**
- Open the **Action menu** and select **sum**
- Tap on cell **A1** and **drag to cell A6** (notice the edit box updates)
- Press **EXE** (if you changed A2 to 4, cell A7 should now show 44, otherwise 41)
- Tap on cell **A7** and then **tap** to view **A7's** value and formula!
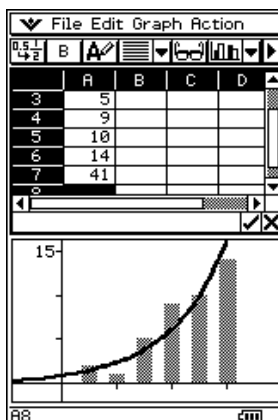
Worksheets downloaded off the web.

Monaco Corporation's website has been upgraded and it is easier to view and download the worksheets. There are links to other informative mathematics education websites too. For teachers we currently offer a large number of 'classroom ready' resources available are designed primarily for the CASIO® FX9750G, FX9750G Plus, CFX9850GB, CFX9850GB Plus models of graphical calculators and the ALGEBRA 2.0. There is also a variety of activity sheets designed for the ClassPad 300 models. All of the activities and worksheets are designed for beginners to advanced users of the G.C. and C.A.S. all useful for all secondary year levels. More have been added to the website since the last newsletter. Bookmark: www.monacocorp.co.nz/casio

Websites of mathematical interest.

A wealth or activity sheets, power point presentations…
http://www.primaryresources.co.uk/maths/maths.htm

Useful CAS and Graphical Links:
Exemplars for new standards: Sample Examination papers and Assessment Schedules have been produced by NZQA for the two new Level 1 standards:
90799 Demonstrate an understanding of straightforward algebraic methods http://www.nzqa.govt.nz/nqfdocs/ncea-resource/exams/2007/90799-exp-07.pdf for the assessment or the pdf version of the assessment schedule and http://www.nzqa.govt.nz/nqfdocs/ncea-resource/schedules/2007/90800-asc-07.doc
90800 Demonstrate an understanding of the features of graphs http://www.nzqa.govt.nz/nqfdocs/ncea-resource/exams/2007/90800-exp-07.pdf for the assessment
 http://www.nzqa.govt.nz/nqfdocs/ncea-resource/schedules/2007/90800-asc-07.pdf for the pdf version of the assessment schedule
[N.B. The level 2 CAS standards will be released late 2007, early 2008.]
Visit ClassPad Corner, CasioEd's web pages for lesson ideas and teaching material.
With two new units of work *Wind in your Sails*; right-angle triangle trigonometry and *Seeing Double*: teaching and learning of algebraic identities at an introductory level (approximately Year 10)
http://www.casioed.net.au/teachers/classpad/classpad_corner.php
Looking for some User Manuals for the ClassPad 300, OS2 and OS3 and other helpful documents?
http://www.casioed.net.au/downloads/classpad_download.php

Maths in general:
Linear Programming Grapher (Two Variables)
http://people.hofstra.edu/Stefan_Waner/RealWorld/LPGrapher/lpg.html
NuLake
https://www.kiwisecure.co.nz/nulake/data.html Link to useable data sets.
2- and 3- digit multiplication http://www.youtube.com/watch?v=IIWmlcwFaVU.
New Math – subtraction from Tom Lehrer http://www.youtube.com/watch?v=tx5KDyvlG3Q&mode=related&search= http://www.youtube.com/watch?v=RY_Onl5cy-8&mode=related&search The Simpsons on maths
The quadratic formula rap song http://www.youtube.com/watch?v=H_7lNT9oDzI
This applet below is great for studying the volume of a rectangular prism and how to maximize it. The graph simulates a piece of paper that is 8 units by 10 units long. Drag your cursor in the top left quadrant. Dotted lines will show how much of the paper's corners will be cut. Click the "Cut and Fold" button and the paper will fold into a box.
http://www.mste.uiuc.edu/users/carvell/3dbox/default.html
The sliders change the parameters a, b, h and d in the trigonometric functions:
$y = a \sin[b(x - h)] + d$ and $y = a \cos[b(x - h)] + d$.
http://members.shaw.ca/ron.blond/sc.APPLET/index.html
Once a graph of a function is determined you can obtain the graphs of related functions through scaling and shifting.
e.g.   A$f(x)$ The graph of f with y values scaled by a factor of A
   $f(x$-c)   The graph of f shifted |c| units to the right if c > 0 and to the left if c < 0
   $f(kx)$ The graph of f scaled horizontally be a factor of k
   $f(x)$+b   The graph of f moved vertically b units
http://colalg.math.csusb.edu/~devel/precalcdemo/circtrig/src/sineshift.html
A sailing simulator and its links to trigonometry concepts
http://www.nationalgeographic.com/volvooceanrace/interactives/sailing/index.html
Online sudoku

The "Butterfly Effect", or more technically the "sensitive dependence on initial conditions", is the essence of chaos. An applet illustrating the Lorenz Attractor.
http://www.its.caltech.edu/~mcc/chaos_new/Lorenz.html
Maths week games are still operating.
http://www.nzamt.org.nz/mathsweek2007/index.php?option=com_content&task=view&id=129&Itemid=144&PHPSESSID=73caf2834ec2439054e3642be92b2690
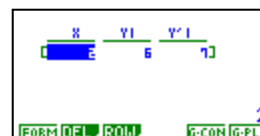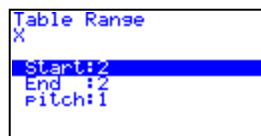
Classroom Activities.

Achievement Standard 90286

Find and use straightforward derivatives, 2006 external paper, to be read in conjunction with the paper.

QUESTION ONE

Find the **gradient** of the curve $y = 3x^2 - 5x + 4$ at the point where $x = 2$.

Cannot be done on the graphic calculator*, $\dfrac{dy}{dx} = 6x - 5$

At x = 2, gradient = 7.

QUESTION TWO

The **gradient function** of a curve is $f'(x) = 8x^3 - 5$.

The curve passes through the point (1,4).

Find the **equation** of the curve. Cannot be done on the graphic calculator, $f(x) = 2x^4 - 5x + c$

At (x,y)=(1,4)

c = 7
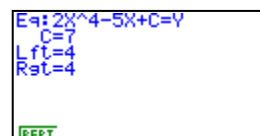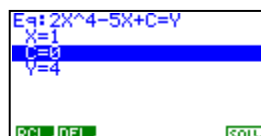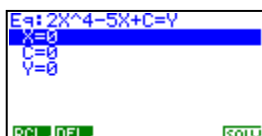
QUESTION THREE

The curve shown in the graph has the equation $y = 12x - 3x^2$.

Calculate the **shaded area**.

Cannot be done on the graphic calculator, $\displaystyle\int_0^4 (12x - 3x^2)dx = \left[6x^2 - x^3 \right]_0^4$
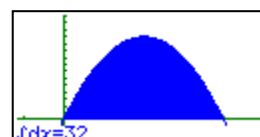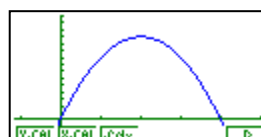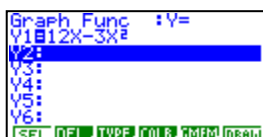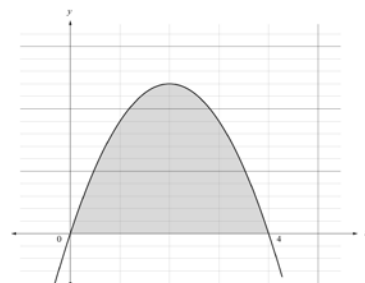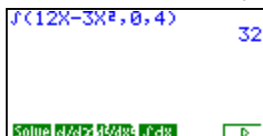
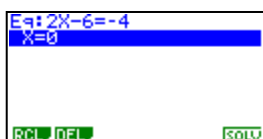$\displaystyle\int_0^4 (12x - 3x^2)dx = 32 \text{ mu}^2$
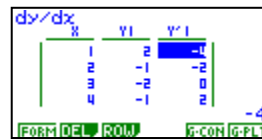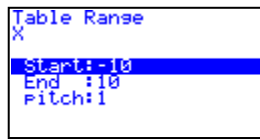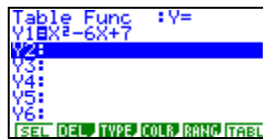
QUESTION FOUR

The gradient of the curve $y = x^2 - 6x + 7$ at the point P is -4.

Cannot be done on the graphic calculator*, $\dfrac{dy}{dx} = 2x - 6$

Find **the coordinates** (x,y) of point P.

Solving $2x - 6 = -4$:
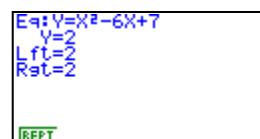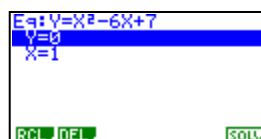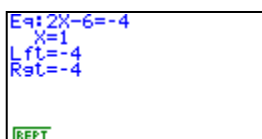
The coordinates of point P are (1,2)

QUESTION FIVE

A weather balloon is released from the ground.

The rate at which it gains height is given by $v = 2 - 0.1t$, where v is the rate of change of height in kilometres per hour and t is the time after release in hours.

What **height** will the balloon have reached after 3 hours?

Cannot be done on the graphic calculator, $\int v \, dt = 2t - 0.05t^2 + c$, [*N.B. Here c = 0 as it starts from ground level.*]
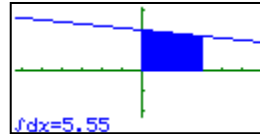
$\int v \, dt = 5.55$ km

QUESTION SIX

A bend on a racing circuit can be described by the curve $y = -x^2 + 4x + 5$ relative to a set of axes on a racing track. A driver loses control of the car at the point (5,0) on the track, and the car continues straight ahead (i.e. along the tangent to the curve at that point).

Find the **equation of the path** that the car follows after the driver loses control.

Cannot be done on the graphic calculator*, $\dfrac{dy}{dx} = -2x + 4$
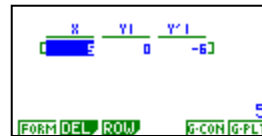
At x = 5, gradient = -6
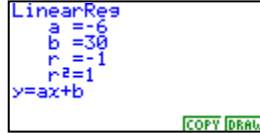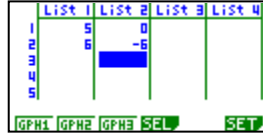
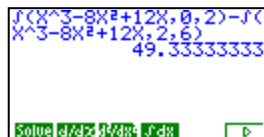The **equation of the path** is: $y = -6x + 30$

QUESTION SEVEN

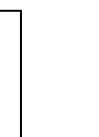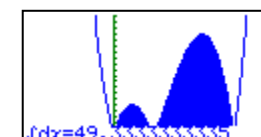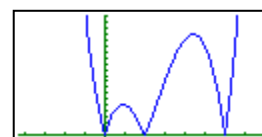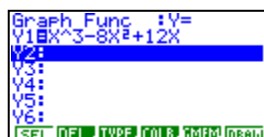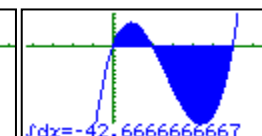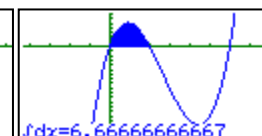A curve has the equation $y = x(x-2)(x-6) = x^3 - 8x^2 + 12x$
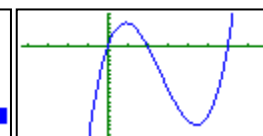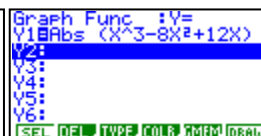
Find the total area enclosed by the curve and x-axis between $x = 0$ and $x = 6$.

Cannot be done on the graphic calculator, $\left[\dfrac{x^4}{4} - \dfrac{8x^3}{3} + 6x^2\right]_0^2 - \left[\dfrac{x^4}{4} - \dfrac{8x^3}{3} + 6x^2\right]_0^2$

Area $= \displaystyle\int_0^2 (x^3 - 8x^2 + 12x)dx - \int_2^6 (x^3 - 8x^2 + 12x)dx$

OR

Area = $49\frac{1}{3}$ mu^2

QUESTION EIGHT

A courier firm has a restriction on the size of parcels that it will carry at the normal rate.
The sum of the length, width and height of any parcel must be less than 162 cm.
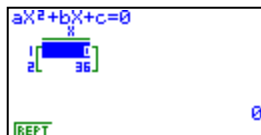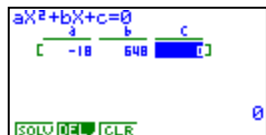The length of a box parcel is twice its width.
Find the maximum possible volume of the parcel that can be carried at the normal rate.

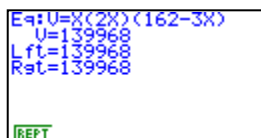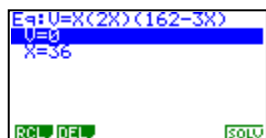Let x be the width, $2x$ be the length and h be the height
Forming the equations from the information $3x + h = 162$, i.e. $h = 162 - 3x$
$V = x.2x.(162 - 3x) = 324x^2 - 6x^3$

For the maximum volume: $\dfrac{dV}{dx} = 0$, i.e. $648x - 18x^2 = 0$, cannot be done on the graphic calculator*.

x = 0 or x = 36

Hence maximum volume $V = 139968$ cm^3
* - see worksheet that illustrates **'Finding the derivative function in STAT mode'.**

Help desk.

Question:
We can enter single data values for stats graphs and calculations but is there a way of entering 5 lots of 24 without entering 24 five times. I cannot find any reference to it in the instruction book – just that you can enter batches of different numbers with ( ) and commas.

Response:
Enter the data in list 1 and the frequency in list 2 in STAT mode
Enter into Graph [F1] or CALC [F2] and then to SET [F6] changing the frequency to List 2, rather than its pre setting to 1.

Question:
We were trying to solve sinx = -1 using graphic calculator. Angle in degree. V-window was set in degrees
Using graph menu, Eeter y1= sinx and Y2= -1, then Graph followed by G-solve, isct,
Result: Calculator says not found!
On V-window: Xmin: -360, Max: 360, Scale 1, Ymin:-1, Max:1, Scale:1

Response:
Make sure that the V-window is set in radians particularly if the intersection is a tangent to a trigonometric graph as the graphic calculator solves by utilising the Newton-Raphson method and in degrees can send the tangent line and solving for y = 0 outside of the V-window domain.

A last word!

Well again, that's all I can fit onto the **unusual** 6 pages! Have a great term 4! Hope to see you at some workshops or next term via this newsletter or otherwise! If you would like to contribute or have suggestions as to what you would like to have discussed via this medium, please do not hesitate to contact either by snail - mail, email, telephone, text or fax.

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Graphic Technologies
73 Viewmont Drive
Lower Hutt
Phone: (04) 569 1686

Would you like to receive
this mailout electronically?
Please email your request to:
graph.tech@xtra.co.nz
Fax: (04) 569 1687

Mobile: 027 460 2871

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